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ABSTRACT

To fabricate a technology for teaching young school children with serious behavior problems, classroom materials, curriculum format, and teaching procedures were developed, and problems that evolve from the technology investigated. Two classrooms were architecturally designed to provide the basic needs of a special classroom and to facilitate observation of the children and data collection. The basis of the technology was individualized instruction. Research studies derived from the experiment were cited and implications of a technology of special teaching explored. (CD)

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The Technology of Teaching Young Handicapped Children[1]

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For many years, about 75 in fact, enormous amounts of time, energy, and money have been expended on problems associated with the early education of the retarded and emotionally disturbed child. Unfortunately, the outcome of these efforts has been less than gratifying. Recent surveys have shown that special classes for the handicapped child have been no more effective than the regular elementary classes. Johnson (1962) discussing the problem stated pointedly that special classes have failed because special teachers have devoted themselves to matters other than that which is their main mission - teaching academic skills.

> During the past three decades the general orientation of teacher preparation programs for the mentally handicapped has been (a) an emphasis upon disability rather than ability and (b) the necessity for establishing a "good" mental hygiene situation for the children where they can develop into emotionally healthy individuals. Thus, the pressures for learning and achievement have been largely removed so that the child has no need to progress (p. 68).

Casual observation and discussions with special teachers bear out the contention that there is indeed too little attention given to teaching tool subjects, the justification for this practice seems to be based on a hiatus between teaching and learning and static concepts of intelligence and retardation.

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Recently the art of teaching and the science of learning have been merged into a technology of teaching (Skinner, 1968), and intelligence and retardation have been analyzed as behavioral deficits from biological, physical, and social restrictions in opportunities for development (Bijou, 1966a). One series of studies stimulated by this orientation has concentrated on the development of educational procedures for the institutionalized, retarded child (Bijou, 1965; Bijou, 1966b; Bijou, Birnbrauer, Kidder, & Tague, 1966; Birnbrauer, Kidder, & Tague, 1964; Birnbrauer, Wolf, Kidder, & Tague, 1965; and Birnbrauer & Lawler, 1964). Another sequence of investigations has focused on treatment techniques of the young emotionally disturbed child (Hawkins, Peterson, Schweid, & Bijou, 1966; Risley & Wolf, 1967; Sloane, Johnston, & Bijou, 1967; Sloane & MacAulay, 1968; and Wolf, Risley, & Mees, 1964).

Findings from these studies have provided the underpinnings for the research at the University of Illinois, the main objective of which is fabricating a technology for teaching young school children with serious behavior problems. The project has two aspects: one focuses on developing, in successive stages, an integrated set of classroom materials, a flexible curriculum format, and an explicit set of teaching procedures; the other on investigating problems that evolve from the technology. We shall describe these operations, summarized from what we have learned, and point out some specific implications for teaching the handicapped child.

Toward a Technology of Special Teaching

The process of fabricating the technology has three characteristics: First, all teaching materials and techniques are developed in the classroom and involve the teacher and her assistant. Second, guidelines for changing materials and teaching procedures are based on a conception of teaching as the arrangement of conditions and contingencies of reinforcement that expedite learning (Skinner, 1968). Third, the effectiveness of each innovation is evaluated by the performance of children studied individually.

The Physical Setting

Two classrooms were architecturally designed to provide the basic needs of a special classroom and to facilitate observation of the children and data collection. Figure 1 shows both classrooms flanked by an observation room with a large, one-way viewing screen, recording

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equipment, and listening devices. Opposite the wall with the one-way screen are three small rooms: a toilet room, a water-play room, and a tutoring room. Each of these interior rooms has a window that faces the classroom, enabling the teacher in the main part of the classroom to observe what is taking place there. Desks, chairs, and partitions are portable for maximum flexibility in arranging individual and group teaching situations. Data are collected on individual children in the classroom for field descriptive (e.g., Bijou, Peterson, & Ault, 1968) or a field-experimental study (e.g., Peterson, Cox, Bijou, in press) or in one of the rooms on the floor below the classrooms for

an individual laboratory study (e.g., Bijou, 1968a). The laboratory rooms are shown schematically in Figure 2. Each room is equipped with a one-way screen and each room has recording and listening devices.

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Insert Figure 2 here
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The Children

The children are of kindergarten and primary school age - from five to eight - who have been referred to the Laboratory classes because of serious social and academic problems. Although their handicaps are not so extreme as to require institutional care, they are serious enough to warrant referral of the child to a community treatment agency. The school authorities have described these children as mentally retarded or emotionally disturbed, or as having a learning disability or a serious behavior problem such as being too aggressive or too withdrawn. Here are some examples of the kinds of children admitted:

A six-year-old boy. He is unresponsive to most of the teacher's requests and spends much time wandering around the room mumbling to himself. He avoids contact with others, frequently cowers in the presence of strangers, and rarely interacts with other children. He does, however, play with certain toys. He recognizes most letters and forms some words with them even though he had never attended school before. His limited speech is primarily echolalic.

A six-year-old girl. She says "No" to almost everything that is asked of her, and teases the teacher by doing what she has been forbidden to do when she is sure the teacher is watching her. She

does not interact with other children, but does play with some toys. She has echolalic speech.

A six-year-old boy. He talks out of turn, runs around the room, kicks, hits, pushes, and interferes verbally and physically with the activities of other children. His level of academic skills is beginning kindergarten. His obstrusive behavior resulted in having been transferred from one school to another soon after the beginning of the school year; he was expelled from the second school after one week of attendance, whereupon he was referred to the Laboratory school.

An eight-year-old girl. She is not a behavior problem but her academic achievement is at beginning first grade level. Writing is her most advanced skill. In the regular public school, she was in the third grade, but obviously could not do the work. Her social behavior, too, is below that expected of an eight-year-old.

Functionally speaking, all of the children referred to the Laboratory school are retarded (Bijou, 1966a), i.e., they lack the behavior repertories, academic and social, that schools require of children in kindergarten and primary grades. But merely to say that they are mentally retarded, or to label them with any other diagnostic term, is of no use to the teacher since these labels do not provide the teacher with the kinds of information she needs in order to prepare effective instructional programs. Only a detailed inventory of each child's academic and social skills and the kinds of events that motivate academic achievement will do that.

The Curriculum

In a technology of teaching, the teacher must have booklets,

pages of exercises, workbooks, textbooks, etc. designed for individual instruction and sequenced according to the performance of each child. These materials for the various tool subjects together with their teacher's manual, pre- and posttests, and recording procedures, constitute the formal programs of the curriculum.

The following formal programs are in use and are being refined and extended:

1. Writing. Training proceeds along four progressions, simultaneously:
   a) from writing on wide-lined and wide-spaced paper to writing on finer-lined standard primary paper;
   b) from copying from a model to writing from dictation;
   c) from writing letters to writing words, phrases, and sentences;
   d) from printing to writing in script.

   The program may be initiated with a pencil-holding sub-program.
2. Reading. This program is modeled on the sight vocabulary program of the Rainier School Program (Bijou, et al., 1966). Four procedures are involved in learning each new word:
   a) listening comprehension to determine whether the child has the word in his listening (receptive) vocabulary;
   b) reading discrimination to teach the child to discriminate between new word from other similar words in written form;
   c) readback to teach the child to read the word aloud when presented in written or textual form.
   d) reading comprehension to teach the child the meaning of new words. A brief discrimination program precedes the reading program to ensure that the child can make the necessary

auditory and visual discriminations. Also included in the reading program is a sub-program on simple phonetics to develop word attack skills (techniques to prompt himself when he does not know how to read the word on sight).

3. Arithmetic. This program is also based on the Rainier School Program (Bijou, et al., 1966). It begins with number pronunciation, and proceeds to number counting (chaining) to 20, dot counting, simple addition using finger-counting, subtraction and multiplication. The program also extends into time-telling. The Mini-Max III teaching machine is used in presenting some of the units of this program.
4. Spelling. Children learn to spell words they have had in the reading program by the following procedures:
   a) copying the words from a typewritten model;
   b) testing themselves with Language Master cards with the correct spelling of the word on the back;
   c) testing themselves with Language Master cards.
5. Language. This program teaches the children the use of common adjectives, prepositions, and verbs; subject-verb agreement, gross time relationships (seasons, months, weeks, etc.), and useful personal information (name, address, phone number). Both group interaction and individual desk work are utilized; children master specific concepts individually at their own rate, and learn how to utilize the concepts within the larger group.

There are, in addition, several short, specialized programs which aim to prepare a child for the formal reading and arithmetic programs or to supplement the knowledge or skills in the programs. For example,

there is the plurals program which systematically prompts the child to add the s sound when reading plural nouns.

The class meets from 8:15 a.m. to 12:30 p.m. daily. As the children arrive, they are greeted by the teacher who serves them breakfast and encourages them to talk about their experiences during the previous afternoon and evening, or before coming to school that morning. Relaxed conversations of this sort not only increase communication skills and strengthen social relationships but prime the kinds of social and emotional behaviors that help a child to have a happy and productive school day.

The daily schedule, which is designed to be flexible, is:

8:15	- 8:45	Greeting and breakfast time
8:45	- 9:10	Study period 1
9:10	- 9:35	Study period 2
9:35	- 10:00	Study period 3
10:00	- 10:30	Language period
10:30		Store time
10:30	- 11:00	Recess
11:00	- 11:30	Study period 4
11:30	- 12:00	Story, art, and freeplay
12:00		Store time
12:00	- 12:30	Study period 5

Each child's assignment for each study period, prepared by the teacher and her assistant the afternoon before, is contained in a color-coded folder in his desk. With prompts from the teacher, the child refers to the master chart on the bulletin board for instructions

on which folder to use for each period. Not all the children will necessarily be working on the same subject at the same time, and those who are will probably be working at different levels of materials within that subject. Nor will each child get the same amount or kind of help with an assignment: the teacher will assist some, the assistant others, some will work alone, depending on the achievement level and the study skills they have acquired. For example, the daily program for a child may be as follows: Study period 1, Writing - copying words from typed cards, working in a small group under the teacher's supervision. Study period 2, Arithmetic - doing simple addition facts, also in a small teacher-supervised group. Study period 3, Reading - learning new words and reading for comprehension, working with a tutor. Language period - working on words and sentences in communication skills with whole class participating. Study period 4, Writing - writing numbers and letters from dictation by the teacher, and reading independently in a workbook.

Teacher Practices

The key to a technology of special teaching is the behavior of the teacher. Well-programmed units and a well organized classroom are of little value unless the teacher manages the conditions at her disposal in ways that expedite learning in each of her pupils. So we shall dwell on the instructional repertories of a special teacher in a classroom designed to apply behavioral principles.

1. Techniques of assessing the child. In most school systems, the school psychologist assesses the abilities and achievements of the child. Using psychometric tests and a modified form of psychoanalytic theory, he attempts to predict the child's performance in

class, categorize the cause (etiology) of his problem, and analyze it in "dynamic" terms. Little of the information summarized and interpreted in the psychologist's report is helpful to the teacher in planning an instructional program for the child because generally it does not refer to the specific things the child can do. Even if the school psychologist were trained to provide the kind of information that is relevant to individual program planning, it would still be preferable for the teacher to evaluate her own pupils. The assessment process gives the teacher first-hand acquaintance with what the child can do, his style of performing, and his responsiveness to social contingencies. This kind of direct knowledge is far more helpful to her than a verbal account by someone whose responsibility to the child is already finished.

In the Laboratory school, the teacher's assessment is based on (1) observational data taken during the child's last day or two in the school classroom from which he is being removed, and on his behavior during the first week to ten days in the Laboratory classroom, (2) results from the Caldwell Preschool Inventory (Caldwell, 1967), (3) tests from the reading, writing, arithmetic, spelling, and language programs used in the Laboratory class, and (4) information from medical and school reports and from interviews with the mother, teacher, and school psychologist. From all these sources, she draws conclusions about (a) the child's specific skills and knowledge relative to school work and social behavior; (b) the kinds of social relationships, objects, and activities that are likely to function as reinforcers, and (c) the support she may expect from the parents or guardians. On the

basis of this diagnostic summary, she prepares an instructional program for the child.

In addition to this assessment, the teacher also administers at the beginning and end of the school year the Peabody Picture Vocabulary Test (Dunn, 1959), and the Wide Range Achievement Test (Jastak, Bijou, & Jastak, 1965). Findings from these scales, which express the child's performance relative to other children of the same age, provide information that is of interest to teachers and principals and some parents.

2. Techniques of program planning and modification. To individualize instruction, the teacher must not only be able to plan each child's program but to modify the sequences when a child encounters difficulties with it. Many of the details of the program planning and modification can be performed by the teacher's aide. But whether the teacher works alone or with an assistant, she must know the principles of programmed instruction so that she can modify the program either to avoid assignments that are too difficult, and hence lead to a high error rate, or assignments that are too easy and resulting in the kind of aversiveness that comes with sheer repetition of well-learned tasks. In other words, she must know programming principles so that she can adjust the materials slightly above the child's repertory. A well-trained teacher does not have to consult a programming expert each time one of her children falters.

In the Laboratory, the teacher routinely spends part of her afternoons reviewing the academic progress of each child and preparing assignment folders for the next day. If she finds that a child

is not making reasonable progress in a subject, she prepares a remedial sequence, one designed to provide the child with skills or knowledge that he seems to lack. Remedial sets are discontinued as soon as the child is able to make progress on the regular program at about the 90 per cent level of proficiency.

3. Techniques of managing reinforcement contingencies. In this category, we include the procedures for evaluating (a) the effectiveness of reinforcers, (b) the appropriateness of a schedule of reinforcement in the light of the target behavior, and (c) the appropriateness of delivering contingencies for the task to be learned.

Evaluating the effectiveness of reinforcers for a child is not simple. It requires far more than an impression of what a child likes or what one thinks he should like. It requires extended observation of sequences of the child's interactions with activities to determine which contingencies are functional in keeping the child working on a task. It also requires continuous monitoring of his school work because the kind of conditioned reinforcers used in the classroom often changes in effectiveness with changes in setting factors, and with advances in learning. In other words, the teacher cannot assume that once she has identified a class of reinforcers that are functional for a child she has completed the task of "understanding the motivation" of that child. She must be vigilant in seeking new reinforcers that are at least equal to or even more effective than those she is using if for no other reason than to avoid decreases in proficiency because of satiation with those stimuli.

Evaluating schedules of reinforcement in the light of the target or desired terminal behavior requires a knowledge of the kinds of

behavior that are generated when the intermittencies of reinforcing contacts are changed. Schedules are manipulated in order to increase the effectiveness of study behavior. For example, a continuous schedule of reinforcement may be changed to an increasing ratio schedule in an effort to build longer and longer chains of having a child remaining seated, paying attention to instructions, carrying out instructions, moving from task to task without dawdling, etc. Or a continuous schedule of reinforcement might be changed to an increasing ratio schedule to encourage working independently and productively, e.g., gradually shifting from reinforcing every correct response on a page to reinforcing every full page of correct responses.

Schedules of reinforcement are also altered to revive old conditioned reinforcers or to develop new onces. A percentage schedule of reinforcement is most frequently used for this purpose. A percentage reinforcement schedule refers to the proportion of time the contrived reinforcer (marks, tokens) is given together with a social reinforcer. In this case, it is a decreasing percentage since, at the beginning of the child's enrollment in the classroom, the contrived and social reinforcer are paired 100 per cent of the time, and gradually the percentage is decreased until the social contingency by itself is functional. Weaning the child from contrived contingencies by a percentage reinforcement schedule was evaluated at the Laboratory last year by observing the behavior of the children in one of the classes near the end of the school year. Recorded for each child were the frequencies of attentive and disruptive behaviors

which were defined as follows: Attentive behavior - eye contact with the teacher or the activity, with the child in his seat. Disruptive behavior - out of seat, away from activity, talking out of turn, as judged by the activity in progress.

The children were observed over a period of 16 days, 12 days with tokens in effect, and 4 days without tokens. Data showed that when marks were in effect, the average percentage of attending behavior for four of the eight children was 84.0; the average percentage of attending behavior was 80.3, and of disruptive behavior, 12.0. Since the elimination of marks did not alter the children's behavior to any significant degree, the mark system was abandoned at that time.

We have discussed, then, the procedures for evaluating the effectiveness of reinforcers, and the appropriateness of a schedule of reinforcement for terminal behaviors. We turn now to the third aspect of managing the contingencies of reinforcement which pertain to delivering reinforcers in ways that are appropriate to the behavior to be learned. We are referring here to the differential techniques used (1) to modify the form of a response, such as in writing letters, and (2) to develop new knowledge, such as in reading words. Both types of learning require the child to give a constructed response (writing and saying). However, writing skills are best acquired when contingencies follow <u>shaping</u> procedures, while learning to read words is most rapidly strengthened when contingencies follow <u>stimulus control</u> procedures. To improve a child's writing, the teacher should deliver contingencies for correct and incorrect responses in ways which strengthen the entire form of the response; to enhance his ability to read words, she should manage consequences to increase

the probability that the child will give the accepted verbal response when the word is presented visually. We hasten to add that writing as well as other manual skills also require stimulus control (e.g., paying attention to the details of the model to be copied), and reading also involves shaping procedures (e.g., learning to articulate words) but the training described here stresses the development of the characteristic aspect of these two types of responses.

4. Techniques of modifying social behavior and precurrent academic behavior. These are programs that the teacher "carries around in her head." They are aimed at helping the child to acquire repertories serviceable in the school culture, e.g., helping a child to hang up his coat on entering the classroom, or encouraging a child to try finger painting. These informal programs consist of the skillfull use of prompts, cues, and priming techniques to produce the desired behavior of fading methods to transfer stimulus control to the appropriate set of circumstances, and of schedule manipulation to maintain the behavior acquired.

A new teacher in the Laboratory classroom is instructed in these techniques in a kind of clinical case procedure, i.e., as they pertain to the behavior and circumstances of an individual child. Moreover, she is given opportunities to observe an experienced behavioral teacher and to discuss with her the objectives for each child and the techniques she used to achieve them. When she tries out these practices in her own class, she discusses her successes and failures with members of the staff, usually in an informal conference held at the end of the school day.

5. Techniques of monitoring the daily activity of each child.

Recording techniques which provide a monitored account of a child's behavior are an integral part of a behaviorally engineered classroom. The use of monitoring measures follows from defining teaching as the arrangement of conditions and reinforcement contingencies to expedite learning, and from the fact that the technology of teaching is in the early stages of developing its procedures. Hence, there is strong and pervasive tendency to use systems that immediately yield information on the effectiveness of any innovation.

In the Laboratory classroom, the teacher and her assistant collect data on each child's progress in the formal academic programs. For example, in the reading and arithmetic programs, data are recorded on errors, the kind or kinds of contingencies applied and their schedules of contacts. Error rates (percentages) and reinforcement contacts are summarized on data sheets, and from time to time, graphs are prepared to improve the teacher's perspective of the child's performances in these subjects.

Data are also taken on the child's progress on the programs for remediating problem behavior. These are usually counts of instances or frequencies of occurrence, grouped in prearranged categories.

6. Techniques of training the teacher's assistant. Even with well programmed materials, serviceable teaching aids, and a good grasp of the principles of contingency management, the special teacher needs a helping hand in individualizing teaching, i.e., in evaluating and preparing assignments and in making the conditions for learning more attractive. She needs an assistant who likes children, is highly reinforced when a child makes progress, and is eager to learn new teaching techniques. To be maximally helpful, the assistant should

be trained by the teacher with whom she will be working.

In a Laboratory class, the assistant is trained to assemble the daily assignments in each subject for each child, to prepare remedial sets, to keep monitored data, to tutor a child, and to supervise individual learning in small group situations. Training starts with the tutor's observing the teacher in action. She is then given opportunities first to assist the teacher in tutoring a child, then to tutor under the supervision of the teacher, and finally to tutor without supervision. When the teacher is satisfied that her aide has learned how to establish a pleasant relationship with a child, how to use prompts and contingencies appropriately, and how to collect data, the formal apprenticeship in tutoring is terminated.

In addition to the six techniques described, it is desirable, perhaps essential is a more appropriate word, that the teacher have one other qualification: an optimistic attitude about the learning potential of each of her pupils. No one would deny that an optimistic attitude in a teacher is preferable to a pessimistic attitude. But in a behavior analysis approach to teaching, this requirement evolves naturally from one of the basic assumptions of the theory; namely, that the behavior one observes in a child is determined by the history of the child and the circumstances at the time of the observation. Hence, when a child is making reasonable progress in an academic or social program, the materials and the reinforcing contingencies are assumed to be adequate for him. On the other hand, when he falters, the materials, the reinforcers, or both, are assumed to be inadequate for him. When a child fails to make progress, the course of action

is clear: Analyze the source of the problem and present a modified set of conditions, monitor the effort, and repeat, if necessary, until the child shows progress. (Escape hatches attributing lack of progress to mental retardation, learning disability, or some other trait, are closed.) The cherished optimistic attitude, therefore, carries with it a willingness to view each problem behavior as a personal challenge in modifying the educational environment so that the undesirable behavior will give way to desirable behavior. Under these circumstances, improvement in the child's behavior, even the slightest, will be highly reinforcing to the teacher, and as a consequence, she will be more likely to try harder on the next challenge, and more convinced than ever that teaching can be a most gratifying profession.

Formal Research

The formal investigations undertaken at the Laboratory fall into two groups: those which aim to improve research methodology, and those which explore teacher-child and parent-child functional relationships.

Studies on Research Methodology

Three studies on research methodology have concentrated on procedures appropriate for analysis of behavior in natural settings, such as the classroom, home, or clinic. The first illustrates a method for describing the behavior of a child as it occurs naturally and without any experimental manipulation (Bijou, et al., 1968). This approach, which is offered as an alternative to describing behavior in the form of verbal statements (e.g., Barker & Wright, 1955), or rating scales (e.g., Baldwin, Kalhorn, & Breeze, 1949), involves

(1) specifying the situation in which a study takes place, (2) defining the critical behavioral and environmental events in observable categories, (3) recording the frequencies with which these events occur, (4) estimating observer reliability, and (5) presenting the data in graphic form. These steps are illustrated in a descriptive study of a four-year-old boy attending a university nursery school. The account details the child's sustained activity (on-task behavior) and social interactions during the school activities over a period of 28 days. One of the advantages of the frequency category is that it provides data that can be used, without alteration, for an experimental study in the same situation. That is to say, a descriptive study of this type yields an account of behavior which may serve as a multiple baseline for ferreting out which events are functionally related.

The second paper on research methodology delineates a procedure for experimenting with stimulus and response relationships in natural settings (Bijou, Peterson, Harris, Allen, & Johnston, 1969). It outlines the procedure for defining response and stimulus variables, illustrates workable response and stimulus categories, and suggests ways of establishing baselines, manipulating independent variables, and representing findings.

The third paper describes a method, consistent with the two described above, that may be used to plan and guide treatment programs (Bijou & Peterson, in press). Steps are outlined which show how observational techniques may serve to assess the entering repertories of a child (diagnosis), how to plan the details of his treatment regime, how to monitor his progress, and how to assess the outcome of

treatment. The approach is particularly serviceable for training, education, therapy, and rehabilitation programs which depend on systematic feedback for their alterations.

Studies on Teacher-Child and Parent-Child Functional Relationships

Some of the investigations of functional relationships have dealt with teacher-child relationships as they pertain to academic learning in group situations (Peterson, Cox, & Bijou, in press). The contention is that children can work productively in a classroom group if the foundations for the required behavior are first laid in a one-to-one tutorial situation. Two experiments were performed. The first showed that the high rates of learning developed in a tutorial situation were maintained in a group of two children. The second study demonstrated that the high rates of learning developed in single tutorials were maintained in a group of six children.

Another study on teacher-child relationships was concerned with the multiple effects of reinforcing verbal behavior (Sajwaj, Twardosz, Kantor, & Burke, 1970). The effects of reinforcing the verbal behavior of a seven-year-old retarded boy in a freeplay period was observed both in that period and the following one - the group-learning period (circle time). During the freeplay period, when she attended to his verbal overtures, his verbal behavior toward the teacher increased, his play with toys was more "girlish" in character, and appropriate peer behavior decreased. During the circle time group activity which followed (when no special attention was paid him), his appropriate behavior increased and, conversely, his disruptive behavior also increased. These data suggest that reinforcing this child's social behavior toward the teacher not

only increased the rate of this particular behavior but in the same situation also altered the child's toy-play and peer-play behaviors. That same manipulation, furthermore, resulted in altering the child's behavior in the next class activity. Hence, reinforcement of social behavior in the preceding period was correlated with a higher rate of appropriate group behavior in the succeeding period.

Other studies exploring functional relationships have focused on problems of parent-child relations in the home. One such investigation centered on the problem behavior of a preschool boy during lunch time (Bijou, 1968a). Data were taken on his eating and his out-of-seat behavior. Using bits of dessert as the reinforcing contingencies, the experimenter demonstrated that the child's eating problems could be eliminated.

Summary and Conclusion

Granted that the behavioral technology of teaching handicapped children is in its formative stage, enough has been accomplished to demonstrate that this technology has tremendous potential for helping these children acquire essential academic and social behavior. Based on principles derived from 45 years of laboratory research, this approach to special teaching will undoubtedly become increasingly effective as further advances emerge from basic and applied research.

We do not expect school administrators to model their special classes on the classes described here mainly because the Laboratory classes have been designed primarily to facilitate research on the technology of special teaching. To gain acceptance and approval, the format of special classes in the public school would vary in pupil composition, size, and curriculum in accordance with the policies

of the various school boards. However, classes based on the research described here would have certain features in common: a motivational plan based on positive reinforcers that are meaningful (functional) for each child; programmed instruction in reading, writing, arithmetic, language, and related subjects; and teachers skilled in arranging conditions so as to encourage academic and social learning. Such special classes would provide handicapped children with an educational environment not only pleasant and enjoyable, but also conducive to good academic achievement.

The development of an effective technology of special teaching has far-reaching implications for education, especially for the training of teachers. Training potential teachers in the behavioral technology described here requires a college curriculum that has yet to be developed. Because the approach is derived from relatively new assumptions and conceptions about human development, learning, instruction, assessment, emotion, and motivation, any attempt to emerge behavior analysis and applied behavioral analysis with subjects traditionally taught in teacher training courses would only dilute the potency of the technology. A thorough revision of the curriculum in teacher training is indicated. Another implication of this approach relates to teaching personnel. Since this technology is based on individualized instruction, each child requires more time and attention than a teacher working alone can provide. As we have pointed out, an aide is necessary to help prepare individual programs, conduct tutorials, and keep records. A great deal of formal education is not necessary; the aide may be a high school or college student, a parent, or a capable retired man or woman. The

third implication of a technology of special teaching is that special classes should be designed for and limited to kindergarten and elementary school age children, to which they should be assigned as soon as their problems are identified. Special classes restricted to young children before they become "failures" have both a remedial and preventative function. The fourth implication, and the most important of all, bears on the necessity for individual instruction in all elementary grades. The gains a child makes in a special class cannot serve as a foundation for further academic achievement unless the programs in special and elementary classes are interrelated in all essential details, so that a child can smoothly and readily make the transition from special to regular class. Such meshing can be realized only if both classes are organized and operated on an individualized instructional basis such as is attempted in prescription teaching, or the Individual Pupil Instructional plan. This is not an unrealistic suggestion since several schools already follow this plan, among them the Prairie School in Urbana, Illinois.

References

Baldwin, A. L., Kalhorn, J., & Breese, F. H. The appraisal of parent behavior. Psychological Monographs, 1949, 63, (4), Whole No. 299.

Barker, R. G. & Wright, H. F. Midwest and it's children: The psychological ecology of an American town. New York: Harper & Row, 1955.

Bijou, S. W. Experimental studies of child behavior, normal and deviant. In L. Krasner & L. P. Ullmann (Eds.), Research in behavior modification. New York: Holt, Rinehart & Winston, 1965.

Bijou, S. W. Functional analysis of retarded development. In N. Ellis (Ed.), International review of research in mental retardation. Vol. I. New York: Academic Press, 1966 (a).

Bijou, S. W. Application of experimental analysis of behavior principles in teaching academic tool subjects to retarded children. In N. N. Haring & R. J. Whelan (Eds.), The learning environment: Relationship to behavior modification and implications for special education. Lawrence, Kansas: University of Kansas Publications, School of Education, 1966 (b), 16, No. 2.

Bijou, S. W. Research in remedial guidance of young retarded children with behavior problems which interfere with academic learning and adjustment. Final Report Project No. 5-0961, Grant No. OEG-32-23-1020-6002, U.S. Dept. of Health, Education, and Welfare, Office of Education, Bureau of Research, Washington, D.C., June, 1968.

Bijou, S. W., Birnbrauer, J. S., Kidder, J. D., & Tague, C. Programmed instruction as an approach to the teaching of reading, writing, and arithmetic to retarded children. Psychological Record, 1966, 16, 505-522.

Bijou, S. W., Peterson, R. F., & Ault, M. A. A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. Journal of Applied Experimental Analysis, 1968, 2, 175-191.

Bijou, S. W., Peterson, R. F., Harris, F. R., Allen, K. E., & Johnston, M. S. Methodology for experimental studies of young children in natural settings. Psychological Record, 1969, 19, 177-210.

Bijou, S. W. & Peterson, R. F. The psychological assessment of children: A functional analysis. In P. McReynolds (Ed.), Advances in psychological assessment, Vol. II, in press.

Birnbrauer, J. S., Kidder, J. D., & Tague, C. E. Programing reading from the teachers' point of view. Programmed Instruction, 1964, 3, No. 7, 1-2.

Birnbrauer, J. S. & Lawler, J. Token reinforcement for learning. Mental Retardation, 1964, 2, 275-279.

Birnbrauer, J. S., Wolf, M. N., Kidder, J. D., & Tague, C. Classroom behavior of retarded pupils with token reinforcement. Journal of Experimental Child Psychology, 1965, 2, 219-235.

Caldwell, B. The preschool inventory. Princeton, N.J.: Educational Testing Service, 1967.

Dunn, L. M. Peabody Picture Vocabulary Test. Minneapolis, Minn.: American Guidance Service, 1959.

Hawkins, R. P., Peterson, R. F., Schweid, E., & Bijou, S. W. Behavior therapy in the home: Amelioration of problem parent-child relations with the parent in a therapeutic role. Journal of Experimental Child Psychology, 1966, 4, 99-107.

Jastak, J. F., Bijou, S. W., & Jastak, S. R. Wide Range Achievement Test. (rev. ed.) Wilmington, Dela.: Guidance Associates, 1965.

Johnson, G. O. Special education for the mentally handicapped - A paradox. Exceptional Children, 1962, 29, 62-69.

Peterson, R. F., Cox, M. A., & Bijou, S. W. Training children to work productively in classroom groups. Exceptional Children, in press.

Risley, T. R. & Wolf, M. M. Experimental manipulation of autistic behaviors and generalization into the home. In S. W. Bijou & D. M. Baer (Eds.), Child development: Readings in experimental analysis. New York: Appleton-Century-Crofts, 1967.

Sajwaj, T. E., Twardosz, S., Kantor, N., & Burke, M. Side-effects of extinction procedures in a remedial preschool. Unpublished manuscript, University of Illinois, 1970.

Skinner, B. F. The technology of teaching. New York: Appleton-Century-Crofts, 1968.

Sloane, H. N., Johnston, M. G., & Bijou, S. W. Successive modification of aggressive behavior and aggressive fantasy play by management of contingencies. Journal of Child Psychology and Psychiatry, 1967, 8, 217-226.

Sloane, H. N., Jr. & MacAulay, B. D. (Eds.), Operant procedures in remedial speech and language training. Boston: Houghton Mifflin, 1968.

Wolf, M. N., Risley, T., & Mees, H. Application of operant conditioning procedures to the behavior problems of an autistic child. Behaviour Research and Therapy, 1964, 1, 305-312.

Footnote

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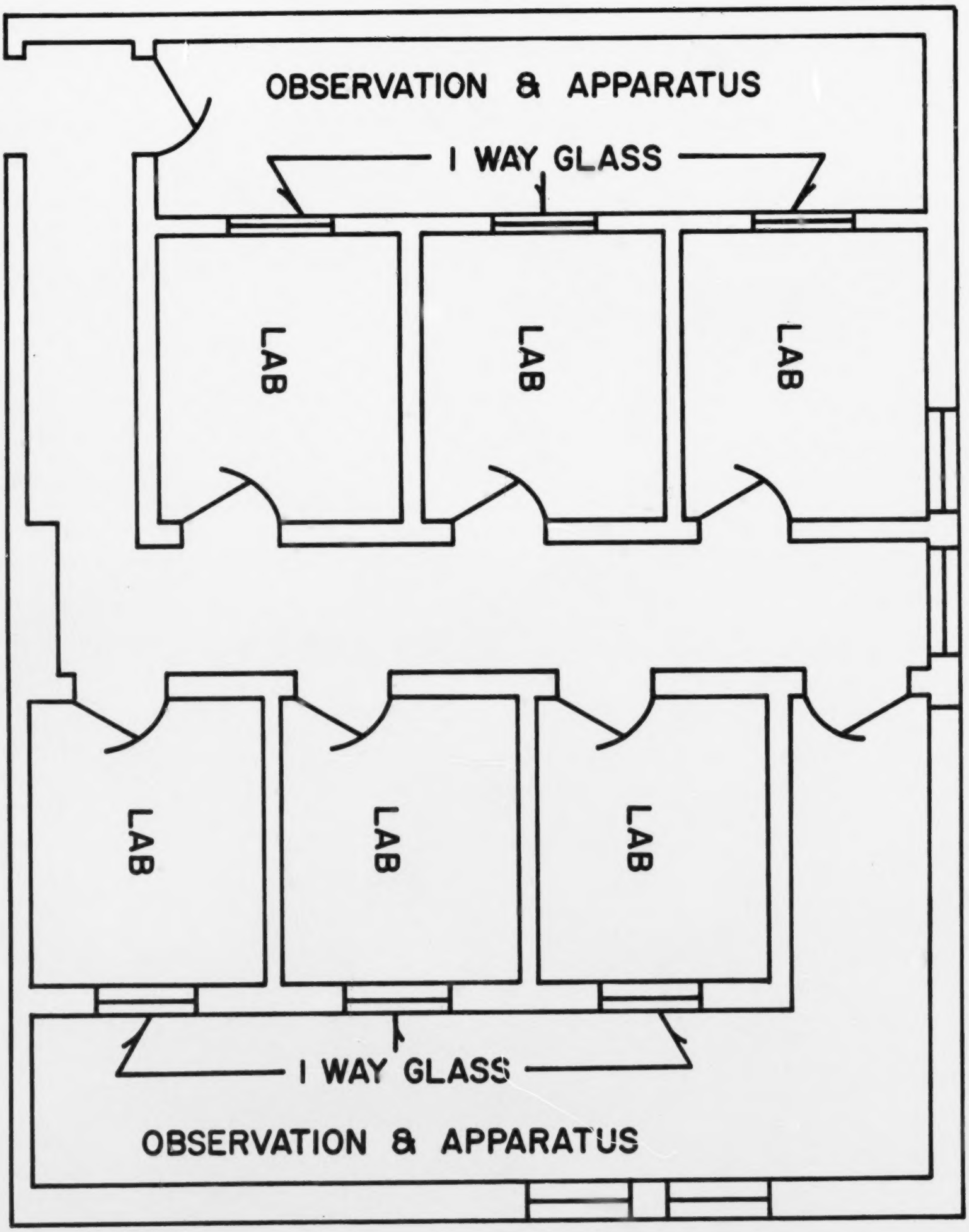
Figure Captions

Figure 1. Schematic diagram of the Laboratory classrooms and observation room.

Figure 2. Schematic diagram of the individual study rooms.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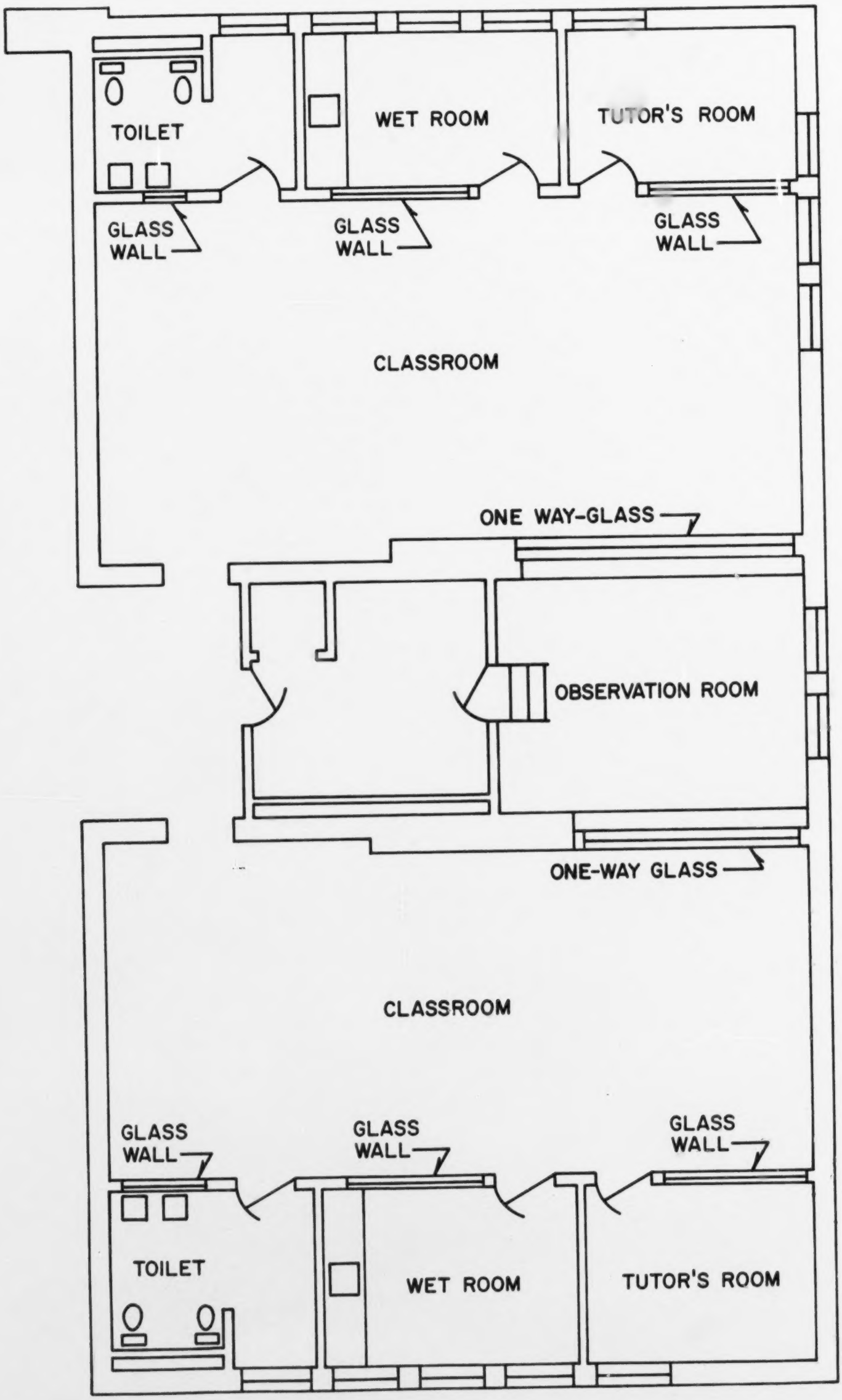
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